# APPENDIX I

## SOILS

### SOIL EROSION CALCULATION

## Wind Erosion Equation

Erosion rates were calculated using the ARS Wind Erosion Equation described in Agricultural Research Service Special Report 22-69, <u>A Universal Equation for Measuring Wind Erosion</u>. This equation, developed by ARS scientists, gives an estimate of wind erosion. The equation was developed from experimental tests in the laboratory and in the field. Most of the work has been done at the ARS Wind Erosion Laboratory at Kansas State University, Manhattan, and surrounding areas. The equation is as follows:  E = IRKFCWDB.

Where:

I = soil cloddiness factor--the ratio between nonerodible and erodible soil aggregates
R = surface cover factor
K = ridge roughness equivalent factor--how rough or smooth the surface is
F = soil abradability or stability factor--the soil textural class or its inherent tendency to erode
C = wind velocity-surface soil moisture factor--where the field is located geographically
W = field width factor
D = wind direction factor
B = the wind barrier factor

## Musgrave Equation – Water

Erosion rates were calculated using the Musgrave Equation as outlined in the BLM Manual Section 7317.22. This equation, developed by G. W. Musgrave, gives an estimate of sheet erosion by water. The equation was developed from measured erosion rates on plots with 10 percent slope, 72.6 feet slope length, and a 30-minute rainfall of 1.375 inches. The equation is as follows:

$$E = FR \ (S/10)^{1.35} \quad (L/72.6)^{0.35} \quad (P/1.375)^{1.75}$$

Where:

> E = sheet erosion in tons/acre/year
> F = basic erosion rate of bare soil in tons/acre/year
> R = cover factor
> S = average slope of contributing area in percent
> L = length of longest contributing meander waterway in feet
> P = maximum 2-year frequency, 30-minute rainfall in inches

## Existing Erosion Rates

The data gathered during the soil and vegetation inventories were used in conjunction with the nomographs and illustrations in BLM Manual 7317.22 and the ARS Special Report to solve the equations. Erosion factors were calculated for each soil map unit and a weighted average of soil erosion rates by soil map unit for each allotment was computed.

## Changes in Erosion Rates

The main variable in the wind erosion equation that would be affected by the proposals in this RMP is the Cover Factor (R), which is the amount of vegetal cover on the ground in pounds/acre. The Soil Cloddiness Factor (I) would decrease in livestock concentration areas because of the breakdown in soil structure which would decrease the amount of nonerodible soil aggregates.

The main variable in the Musgrave Equation that would be affected is also the Cover Factor (R), however it is inversely related to the percent of ground cover. The Basic Erosion Rate (F) would increase in areas of livestock con- centration because soil infiltration and permeability would decrease due to compaction.

The other variables would be essentially independent of grazing management and were considered constant for purposes of analysis. Estimated changes in cover resulting from forage allocation were based on proposed adjustments in stocking rates. A reduction in livestock numbers would increase the amount of vegetation and litter remaining on the ground.

The impacts on soil erosion due to grazing management, which includes grazing systems, range improvements, seasons of use and kinds of livestock, were based on estimated changes in vegetation production in the long term (20 years). An increase in production would increase cover and a decrease in pro- duction would decrease cover.

Changes in soil erosion due to range improvements would be dependent on the kind of treatment. For each treatment, the degree of disturbance was evaluated to estimate the decrease in ground cover (estimated to be 25 to 100 percent in the short term). The majority of areas were predicted to revegetate within approximately two years, reducing erosion rates accordingly. In the long term, reduction in cover, increased compaction, and soil disturbance in livestock concentration areas would cause the erosion rates to increase.

## Soils Map and Table

Most of the soils on public lands in the Monument Planning Area were inventoried by the Soil Conservation Service and Bureau of Land Management between 1980 and 1983. The survey shows the extent and location of the soils and general information for planning purposes. Standards and procedures were followed to meet the requirements of the National Cooperative Soil Survey. The inventory was mapped at a scale of 1:24,000. Mapping units consisted of phases of soil series and complexes. Soil boundaries were drawn on aerial photos using a sterescope and then field checked. Individual soils were iden- tified and described from soil pits. Percentages of each soil within a mapping unit were obtained by on-the-ground observation, photo interpretation, and some aerial observation. An unpublished soil survey report showing the boundary and extent of mapping units and detailed profile and mapping unit descriptions is available at the Shoshone District Office.

Some soils information was taken from existing surveys covering pre- dominantly private lands (USDA, Soil Conservation Service 1975, 1981; USDA, Bureau of Chemistry and Soils 1927, 1928, 1929).

Map 14 shows the broad soil patterns of the planning area. Each soil map unit consists of one or more soils of major extent and some soils of minor extent, and is named for the major soils. The kinds of soil in one map unit may occur in the other map units, but in a different pattern. This map also shows areas with high erosion potential and agricultural potential.

Table I-1 gives soil potentials for erosion, agricultural development, and rangeland productivity. The capability class shows, in a general way, the suitability of soils for most kinds of field crops. The soils are grouped into capability classes according to their limitation if used for crops, the risk of damage when they are used, and the way they respond to treatment. Class 1 has the fewest limitations, whereas class 7 has very severe limitations. Capability class was determined as described in National Soils Handbook (USDA, SCS 1974).

TABLE I-1

SOIL POTENTIALS

| Soil | Map Unit Numbers | Erosion Potential | | Ag Potential Capability Class | Rangeland Productivity Pounds/Acre/Year |
|------|------------------|-------------------|-------|-------------------------------|------------------------------------------|
|      |                  | Wind | Water |                               |                                          |
| Arloval | 3 | Moderate-High | None-Slight | 2, 3 | 1100 - 1500 |
| Banbury | 8, 13, 14 | Slight-Moderate | Slight-Very High | 4, 6 | 350 - 550 |
| Bancroft | 12 | Slight | Slight-High | 3, 4 | 900 - 1300 |
| Carey Lake | 1 | Slight-Moderate | None-Slight | 3 | 900 - 1300 |
| Cinderhurst | 18 | None-Slight | None-Slight | 7 | 250 - 350 |
| Cox | 11 | Moderate | Slight-Moderate | 4, 6 | 350 - 550 |
| Decker | 3 | Moderate | None-Slight | 2, 3 | 1100 - 1500 |
| Declo | 2, 4 | Moderate | None-Slight | 2, 3, 4 | 550 - 850 |
| Deerhorn | 10 | Moderate | Slight-Moderate | 3, 4, 6 | 650 - 950 |
| Feltham | 4, 5 | High | None-Moderate | 3, 4, 6 | 500 - 800 |
| Gooding | 17 | Slight-Moderate | Slight-High | 3, 4 | 450 - 750 |
| Kecko | 7 | Moderate-High | None-Moderate | 2, 3, 4 | 500 - 850 |
| Little Wood | 1 | None-Slight | None-Slight | 4 | 800 - 1200 |
| McBiggam | 12 | Slight | Slight-Moderate | 3 | 1100 - 1500 |
| McCain | 13, 14, 16 | Moderate | Slight-High | 3, 4, 6 | 550 - 850 |
| McCarey | 12 | Slight-Moderate | Slight-High | 3, 4, 6 | 700 - 1100 |
| Minidoka | 15 | Moderate | Slight-High | 3, 4, 6 | 550 - 850 |
| Minveno | 9, 15 | Moderate | Slight-Very High | 4, 6 | 350 - 550 |
| Paulville | 2, 8, 9, 13 | Slight-Moderate | None-Moderate | 2, 3 | 550 - 1200 |
| Portneuf | 6, 15 | Slight-Moderate | Slight-Moderate | 2, 3 | 550 - 850 |
| Power | 16, 17 | Slight | Slight-Moderate | 2, 3 | 550 - 850 |
| Quincy | 5, 6, 7 | High-Very High | Slight-Moderate | 4, 6 | 400 - 600 |
| Rehfield | 10, 11 | Moderate-High | Slight-Moderate | 2, 3 | 600 - 950 |
| Sidlake | 8 | Moderate-High | Slight-Moderate | 3, 4, 6 | 500 - 850 |
| Snowmore | 9 | Slight-Moderate | Slight-Moderate | 3, 4, 6 | 500 - 850 |
| Trevino | 18 | Moderate | Slight-Very High | 4, 6, 7 | 300 - 500 |
| Vining | 5, 7 | Moderate-High | Slight-Moderate | 3, 4, 6 | 500 - 800 |
| Wodskow | 3 | Moderate | None-Slight | 2 | 900 - 1300 |

APPENDIX J

## ECONOMIC CONDITIONS

## LIST OF ASSUMPTIONS

1.  County:  Minidoka

2.  Crop Distribution:
    Alfalfa Hay          33%
    Barley               33%
    Potatoes             34%

3.  Total Acreage of Farm:   210 acres

4.  Will water be pumped?   Yes

5.  Yearly per acre cost of pumping:   $51.08/acre

6.  Irrigation system Cost:   $53.02/acre

7.  SCS soil type percentages:   Type 2 = 5%; Type 3 = 15%; Type 4 = 80%

8.  Wage rate:   $3.35/hour

9.  Annual interest on production credit:   14%

10. Term of production credit loan:   12 months

11. Taxes and overhead:   3% of costs

12. Revenue Adjustment Factor:   10% of total revenue

13. Value of land:   $25/acre

14. Annual payments on land:   $702.86

15. Fiscal Year 84 Normalized Prices

SUMMARY TABLE BY CROP AND WEIGHTED VALUES

| Crop | Percent Distribution | Total Revenue | Total Production Costs | Net Revenue |
|------|---------------------|---------------|------------------------|-------------|
| Alfalfa Hay | 33 | 15,677.48 | 17,494.87 | − 1,187.39 |
| (per acre) | | 226.23 | 252.45 | − 26.23 |
| Barley | 33 | 10,446.98 | 16,989.15 | − 6,542.17 |
| (per acre) | | 150.75 | 245.15 | − 94.40 |
| Potatoes | 34 | 83,143.23 | 72,978.95 | 10,164.28 |
| (per acre) | | 1,164.47 | 1,022.11 | 142.36 |
| Farm Totals | 100 | 109,267.68 | 107,462.97 | 1,804.71 |

29sTABLE J-2

FARM BUDGET

| Operation or Item | Per Acre | | | | Total |
|---|---|---|---|---|---|
| | Times Over | Costs or Receipts | Unit Total | Subtotal | |
| TOTAL REVENUE: ALFALFA HAY | 3.38 Ton at | 67.03/ton | | 226.23 | $ 15,677.48 |
| | | | | | |
| PRODUCTION COSTS | | | | | |
| Establishment – Alfalfa | 1.00 at | 14.88/acre | 14.88 | | |
| Corrugate | 1.00 at | 5.00/acre | 5.00 | | |
| Fertilizing – Broadcast | 1.00 at | 3.75/acre | 3.75 | | |
| P205 | 90.00 unit at | 0.22/unit | 19.80 | | |
| Spraying – Ground Rig | 1.00 at | 4.50/acre | 4.50 | | |
| Furagon, Cygon, Thiedon | 1.50 pt at | 6.25/acre | 9.38 | | |
| Swath – Alfalfa | 3.00 at | 8.00/acre | 24.00 | | |
| Bale – Alfalfa | 3.38 ton at | 7.50/ton | 25.31 | | |
| Haul and Stack – Alfalfa | 3.38 ton at | 5.00/ton | 16.88 | | |
| (Labor [included above] | | | 8.61) | | |
| Subtotal Production Costs | | | | 123.49 | |
| Taxes and Overhead (Farm) | 3 percent of Production Costs | | | 3.70 | |
| Inputted Per Acre Pumping Cost | | | 51.08 | | |
| Inputted Per Acre Irrigation Cost | | | 53.02 | | |
| Subtotal Water Costs | | | | 104.10 | |
| Interest on Production Cost | 14 percent for 12 months | | | 17.81 | |
| Annual Land Payment | | | | 3.35 | |
| | | | | | |
| TOTAL COSTS | | | | 252.45 | $ 17,494.87 |
| | | | | | |
| NET REVENUE: ALFALFA HAY | | | | – 26.23 | $– 1,817.39 |
| REVENUE ADJUSTMENT | 10 percent of Total Revenue | | | 22.62 | $ 1,567.75 |
| ADJUSTED NET REVENUE | | | | – 3.60 | $ – 249.65 |

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| Operation or Item | Times Over | Costs or Receipts | Unit Total | Subtotal | Total |
|---|---|---|---|---|---|
| TOTAL REVENUE: BARLEY | 56.25 bu at | 2.68/bu | | 150.75 | $ 10,446.98 |
| | | | | | |
| PRODUCTION COSTS: | | | | | |
| Disc and Harrow | 1.00 at | 7.00/acre | 7.00 | | |
| Seed – Barley | 125.00 lbs at | 0.13/lb | 16.25 | | |
| Planting – Small Grain | 1.00 at | 7.70/acre | 7.70 | | |
| Fertilizing – Broadcast | 1.00 at | 3.75/acre | 3.75 | | |
| N | 85.00 unit at | 0.31/unit | 26.35 | | |
| Spraying – Ground Rig | 1.00 at | 4.50/acre | 4.50 | | |
| 2,4–D | 2.00 pt at | 1.37/pt | 2.74 | | |
| P205 | 40.00 unit at | 0.22/unit | 8.80 | | |
| Combine – Small Grains | 1.00 at | 25.00/acre | 25.00 | | |
| Haul – Barley | 56.25 bu at | 0.12/bu | 6.75 | | |
| Storage – Small Grains, 6 months | 56.25 bu at | 0.15/bu | 8.44 | | |
| (Labor [included above] | | | 5.62) | | |
| Subtotal Production Costs | | | | 117.28 | |
| Taxes and Overhead (Farm) | 3.00 percent of Production Costs | | | 3.52 | |
| Inputted Per Acre Pumping Cost | | | 51.08 | | |
| Inputted Per Acre Irrigation Cost | | | 53.02 | | |
| Subtotal Water Costs | | | | 104.10 | |
| Interest on Production Cost | 14 percent for 12 months | | | 16.91 | |
| Annual Land Payment | | | | 3.35 | |
| | | | | | |
| TOTAL COSTS | | | | 245.15 | $ 16,989.15 |
| | | | | | |
| NET REVENUE: BARLEY | | | | – 94.40 | $– 6,542.17 |
| REVENUE ADJUSTMENT | 10 percent of Total Revenue | | | 15.08 | $ 1,044.70 |
| ADJUSTED NET REVENUE | | | | – 79.33 | $– 5,497.47 |

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FARM BUDGET

| Operation or Item | Per Acre | | | | Total |
|---|---|---|---|---|---|
| | Times Over | Costs or Receipts | Unit Total | Subtotal | |
| TOTAL REVENUE: POTATOES | 234.30 CWT at | 4.97/CWT | | 1,164.47 | $ 83,143.23 |
| PRODUCTION COSTS | | | | | |
|   Plow Stubble (Moldboard) | 1.00 at | 13.50/acre | 13.50 | | |
|   Disc and Harrow | 2.00 at | 7.00/acre | 14.00 | | |
|   Chisel and Mark | 1.00 at | 8.00/acre | 8.00 | | |
|   Planting – Potatoes | 1.00 at | 48.00/acre | 48.00 | | |
|   Seed – Potatoes | 20.00 CWT at | 9.00/CWT | 180.00 | | |
|   Fertilizing – Broadcast | 4.00 at | 3.75/acre | 15.00 | | |
|   N | 250.00 unit at | 0.31/unit | 77.50 | | |
|   P205 | 120.00 unit at | 0.22/unit | 26.40 | | |
|   K20 | 100.00 unit at | 0.17/unit | 16.90 | | |
|   Spraying – Ground Rig | 1.00 at | 4.50/acre | 4.50 | | |
|   Sencor | 1.00 lb at | 9.83/lb | 9.83 | | |
|   Fungicide (2 Applications) | 6.00 pt at | 3.00/pt | 18.00 | | |
|   Zinc | 10.00 unit at | 1.00/unit | 10.00 | | |
|   Dyston or Temik | 20.00 lb at | 2.20/lb | 44.00 | | |
|   Side Dress | 1.00 at | 8.50/acre | 8.50 | | |
|   Monitor | 1.00 at | 16.00/acre | 16.00 | | |
|   Vine Kill | 1.00 at | 11.00/acre | 11.00 | | |
|   Cultivating – Potatoes | 3.00 at | 8.00/acre | 24.00 | | |
|   Spraying – Aerial | 4.00 at | 7.50/acre | 30.00 | | |
|   Dig and Load – Potatoes | 234.30 CWT at | 0.45/CWT | 105.43 | | |
|   Haul – Potatoes | 234.30 CWT at | 0.20/CWT | 46.86 | | |
|   Storage – Potatoes | 234.30 CWT at | 0.22/CWT | 51.55 | | |
|   (Labor [included above] | | | 27.80) | | |
|     Subtotal Production Costs | | | | 778.97 | |
|     Taxes and Overhead (Farm) | 3.00 percent of Production Costs | | | 23.37 | |
| Inputted Per Acre Pumping Cost | | | 51.08 | | |
| Inputted Per Acre Irrigation Cost | | | 53.02 | | |
|     Subtotal Water Costs | | | | 104.10 | |
|     Interest on Production Cost | 14 percent for 12 months | | | 112.33 | |
|     Annual Land Payment | | | | 3.35 | |
| TOTAL COSTS | | | | 1,022.11 | $ 72,978.95 |
| NET REVENUE: POTATOES | | | | 142.36 | $ 10,164.28 |
|   REVENUE ADJUSTMENT | 10 percent of Total Revenue | | | 116.45 | $ 8,341.32 |
|   ADJUSTED NET REVENUE | | | | 258.80 | $ 18,478.60 |

TABLE J-3

DETAILED COMPARISON OF EFFECTS OF THE ALTERNATIVES

| Element | Alternative A | Alternative B | Alternative C | Alternative D | Sub-Alternative D |
|---|---|---|---|---|---|
| **GRAZING-RELATED** | | | | | |
| Annual Income Change | - $ 6,138 | + $1,600,000 | + $1,400,000 | - $1,200,000 | - $1,800,000 |
| Employment Change | --- | + 86 | + 75 | - 65 | - 102 |
| Range Improvement Costs | | | | | |
| Installation Costs | --- | $2,522,000 | $1,602,700 | $732,500 | --- |
| Income | --- | $1,500,000 | $920,000 | $400,000 | --- |
| Employment | --- | 65 | 42 | 19 | --- |
| Maintenance | --- | $42,100 | $33,500 | $17,800 | --- |
| Income | --- | $24,200 | $19,200 | $9,800 | --- |
| Employment | --- | 1 | 1 | 0 | --- |
| Grazing Fee Changes | - $ 660 | + $104,170 | + $89,974 | - $77,562 | - $195,784 |
| Range Improvement Fund | - $ 330 | + $52,085 | + $44,987 | - $38,781 | - $97,892 |
| Federal Treasury | - $ 247 | + $39,064 | + $33,740 | - $29,086 | - $73,419 |
| State of Idaho | - $ 83 | + $13,021 | + $11,247 | - $9,695 | - $24,473 |
| Total Capital Value Change | | | | | |
| High | - $81,000 | + $13,100,000 | + $11,300,000 | - $9,700,000 | - $24,500,000 |
| Low | - $18,000 | + $ 2,900,000 | + $ 2,500,000 | - $2,200,000 | - $ 5,400,000 |
| Ranches Threatened | 0 | 0 | 0 | 75 | 138 |
| **RECREATION-RELATED** | | | | | |
| Annual Income Change | + $2,000,000 | + $1,900,000 | + $2,000,000 | + $2,100,000 | + $2,100,000 |
| Employment Change | + 202 | + 185 | + 202 | + 206 | + 206 |
| **CROP AGRICULTURE RELATED** | | | | | |
| Annual Income Change | --- | + $4,400,000 | + $2,700,000 | + $300,000 | + $300,000 |
| Annual Employment Change | --- | + 404 | + 228 | + 32 | + 32 |
| Electricity Costs | --- | $18,300,000 | $11,000,000 | $1,300,000 | $1,300,000 |
| Irrigators Share | --- | $2,900,000 | $1,800,000 | $200,000 | $200,000 |
| Others Share | --- | $15,400,000 | $9,200,000 | $1,100,000 | $1,100,000 |
| Water System Costs | --- | $13,900,000 | $8,400,000 | $500,000 | $500,000 |
| **LAND TRANSFER BENEFIT** | $345,800 | $3,678,400 | $2,437,900 | $130,500 | $130,500 |
| **FIRE SUPPRESSION COSTS (Annually)** | $306,180 | $308,400 | $316,180 | $355,180 | $475,160 |
| **SUMMARY TOTALS** | | | | | |
| Total Annual Income Change (Grazing, Recreation and Crop) | + $2,000,000 | + $7,900,000 | + $6,000,000 | + $1,200,000 | + $600,000 |
| Total Employment Change (Grazing, Recreation and Crop) | + 202 | + 676 | + 506 | + 173 | + 136 |
| Annual Costs (Range Improvement and Fire) | $306,180 | $476,600 | $429,815 | $408,905 | $475,160 |